Review

Oxidation and Deformation behaviours of the 316L Stainless-Steel Weldments in Nuclear Plants

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As an essential component in nuclear power plants, which is an important means to solve the global energy crises, the safety of heterogeneous metal welding joints in the main pipelines is very critical. Therefore, to prolong the life of welding joints and improve safety of nuclear power plants, it is of great significance to study the structure of dissimilar metal welding parts and its influence on the deformation behavior of welding parts at room temperature and the oxidation behavior and mechanism of water at high temperature. In this paper, a review of studies on the safety end of 316L stainless-steel/Inconel dissimilar welding as used in nuclear power plants is presented. The weld microstructure and corrosion properties at room temperature and high temperature water oxidation behavior, studied by means of optical microscope, Scanning Electron Microscope (SEM), X-ray photoelectron spectroscopy and Transmission Electron Microscopy (TEM), on the sample of the welding parts were presented and analyzed. Also, studies using the in-situ tensile technique to investigate the influence of microstructure evolution in microstructure crack initiation and propagation, as well as the microstructure evolution rule of welded parts during tensile process were reviewed in detail. The correlation between the articles on microstructure and deformation were analyzed and all the shortcomings were highlighted with suggestions for further research.

Keywords: Dissimilar Metal, Fusion Zone, Weld Corrosion, Residual Stress

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